# **CTU Presents**

Contest Applications of CW Skimmer and the Reverse Beacon Network

Pete Smith N4ZR





#### What is CW Skimmer?

 Windows software, originally released in 2008 by Alex Shovkoplyas, VE3NEA; US\$75 for very flexible license

- Intended mainly as a DXing tool rather than for contesting
  - automatically copies all the calls in a pileup and flags the one who gets through
  - click on him and move your radio to that frequency







# What can you copy in a minute and a half?

📰 CW Skimmer 1.4 - Registered to Pete Smith		_		Callsigns			×
File View Commands Help				Freq	Utc	Call 🔺	$\top$
				7032.7	00:00:49	5J1W	
				7035.3	23:59:58	8P5A	
and the second secon		O DE K1TTT ►		7014.4	00:00:32	9A1P	
- 한 수입 그 있는 것 같아요. 한 것 같아요. 한 것은 없는 것 같아.	-			7014.4	00:00:54	9A1P0	
	021			7014.4	00:01:02	9A1POE	
A monotopicant and my state and many an entering and and and a ferral sector of the state of the sector of the		CQ W4RX		7015.0	00:00:36	9A7A	
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		G CQ IY4W ►		7033.8	23:59:56	AGIB	
- 정말 방법 김 산 것 같아요. 알 것 같아. 병원 방법 전 것 것 같아. 생각 바람				7008.6	00:00:14	AB9H	
and in pany "Wild land land, and and, and some it saw " to a pane be a first way to a land a set of a land, and		CQ K2QMF		7026.9	00:00:11	AE6PP	
이 가슴, 영상, 이 가슴, 이 것 수가, 가슴 것 같아요. 이 것 같아?	020			7026.9	00:00:34	AE6PW	
n beste here and the set of t			99 🕨	7003.2	00:00:27	AJ20	
- Constant and provide the second and a second and a second second at the second second second second second se	12-	O-CQ OM3LA		7006.8	00:00:03	CO8LY	
- 그릇, 오랫동안, 것, 것이 있는 것이 가슴을 깨끗해 봐야 것 못하는 것, 것을 가면	¢4-			7042.0	00:00:00	CT1ILT	
and the second secon				7033.0	00:00:03	CT3EN	
- : : : : : : : : : : : : : : : : : : :	<u>n</u> a			7032.4	00:00:19	CU2A	
and the second secon	11-			7000.6	00:00:13	DFOCG	
- 친구님 동안 같은 것은 물건에 귀엽다. 영화 가슴을 가지 않는 것이 같아요.	-	Carrier		7013.3	00:00:03	DJ5MW	
	-	500 b		7000.6	00:00:02	DL1IA0	
[ 신문 : 11. ) 11 같은 것 같은 모양을 가지 않는 것 같은 것 같이 나라.	018	035		7029.7	00:00:16	DL3KEM	
y when the state of the second state of the best in the state of the second second second second second second		-CQ WC1M		7029.7	00:00:13	DL3YM	
- 그는 친구가 많은 것, 것은 것같은 못 알려야 한 것 같다.	1. J	0		7031.4	00:00:26	DQ4W	
그는 방법 관련을 하는 것이 같이 같이 많이 많이 없다. 것은 것이 없는 것이 없는 것이 없는 것이 없다.	1 T			7028.7	00:00:47	EA1KI	
		🔄 📄 CQ HI7/	DL1JF	7025.7	00:00:08	EA3AKY	
- 현재 방법 같은 날만 가 같은 방법에서 해외에 가지 않는 것이 없는 것이다.	017	ľ		7012.3	00:00:05	EA3EER	
and the second of the second of the second	_	€—DE IK7FMQ	599	7027.1	00:00:06	EA4KA	
and a lower in the later to an and a lower lower and a second second second second second second second second	°.		599	7027.5	00:00:24	EA5FV	
그는 선물님 영토님은 것 것 것 같은 것 같아요. 것 같아요. 가슴을	-			7004.0	00:00:29	EA5RS	
에 가장에 가장 가장 가장에 많이 가장 방법을 받았다. 가장가 있습니다. 가장가 가장하는 것은 것은 것은 것을 가장하는 것은 것을 가장하는 것은 것을 다 가장이다. 것은 것은 것은 것은 것을 가장하는 것을 수가 있다. 것을 것을 것을 것을 수가 있다. 것을 것을 것을 것을 것을 것을 수가 있다. 것을	-	• CQ N2MM 5	599 🕨	7033.8	00:00:02	EAGIB	
	<u>01</u> 6	8		7005.0	00:00:19	EA8EW	
방법은 영상에는 영상을 받은 것이 같은 것이 가지 않는 것이 없는 것이 없는 것이 없는 것이 없다.	-			7005.6	00:00:09	EA8PP	
	-	<b>•</b>		7014.9	00:00:54	ED2JJ	
Control of the second se Control of the second second second second second second second second second second second second second s second second s second second se	-			7003.2	00:00:37	EE5S	
- 분명의 모양적한 방법은 영영에는 바람과 귀엽한 것이다.	015		9	7028.7	00:00:39	EG4XRE	
	013	CQ ED2JJ	~	7024.6	00:00:58	EG5EEE	
- 비안 영양은 방법은 물건을 다 같은 물건을 얻었다. 방법은 것 같이 많이 많이 많이 많이 많이 없다.	2-	6		7004.5	00:00:29	EK2NG	
				7030.0	00:00:51	ER4EHK	-
LIJFI » DE HI7/DLIJFI QRZ? » KT3Y 5NN	N » C	:Z » I7		/00/0	00101142	FWIWFF	
🖬 🚊 58% Decoders: 183 of 617 SNR: 13 dB	30 WPM	Tln: 0 users	11		Calls:	159	

o ICOM





### "Deployment" Options

- 3-KHz radio mode
  - Uses transceiver audio via sound card
  - Limited to 3 KHz bandwidth provided by radio
  - Mainly a "demo" mode





#### Softrock



- Simple SDR kitted by <u>http://KB9YIG.com</u>
- 96 KHz bandwidth, determined by sound card
- Requires gain and phase correction to avoid images – CW Skimmer provides
- Single-band and multi-band versions available - \$15-56 in kit form







PC SDR Program



Diagram courtesy WB5RVX CONTEST

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PC Line IN

(stereo)

### Softrock RX Ensemble II 1.8-30 MHz







#### Softrock-IF



- Uses Softrock (or other SDR), tapping IF of station transceiver.
- Covers 24-KHz bandwidth centered on transceiver frequency
- Requires CAT; center frequency control via Telnet
- Same image issues





#### **Stand-alone SDRs**



- Mercury HPSDR
  - Supported by CW Skimmer, but availability currently uncertain
- SDR-IQ
  - Band-switching, up to 196 KHz/band, 500 Hz 30 MHz; uses Spectravue or CW Skimmer
- QS1-R
  - With SkimSrv, 7 x up to 192 KHz bands simultaneously, including 6M; uses SDRMAXII or CW Skimmer



















Partial SDR-IQ block diagram courtesy Pieter Ibelings and RFSpace, Inc.





#### Antennas

- Option 1 share RX antennas with station radios
- Option 2 dedicated antenna









### **Practical Hardware Issues**

- RX gain and in/out of band strong signal handling
- TX RF leads to busted spots
- Expensive silicon needs protection
  - Receiver protectors 1.4 volts or less
  - The best solution Disconnect/ground SDR antenna when transmitting







#### An Example of a Protector



#### Diodes can cause intermodulation

•Basic problem with SDRs is voltage, not power, so bulb as fuse may not act quickly enough





#### **Receiver Protector Options**



- "Fuse" #47/49 bulb
- Back to back diode strings shunting the antenna to ground – 2 x 1N914s each way
- Series capacitor(s) to block DC
- Gas tube lightning only







#### VK1LW's QS1-R "beacon"







#### Telnet



- Added to CW Skimmer in early 2008
- DX Cluster format accepted by all logging programs – typically Skimmer spots flagged with - #
- Simple server, accepts a few commands
- Adjustable callsign validation level





### **Callsign validation**



- 4 levels minimal, normal, aggressive and "paranoid."
- Applies multiple criteria and "tell me again ... and again."
- "Paranoid" uses standard master.dta file





# **Local Skimmer in Contests**



- Even with SO2R will generate many, many spots
- Multi-ops have a problem
- The off-site solution, and how to keep it legal





#### The Reverse Beacon Network



- Original idea by Felipe, PY1NB in March 2008
- He wrote "aggregator" software to transfer spots from individual CW Skimmer/SkimSrv "beacons" to a central database
- Combined spot stream archived and displayed at <u>http://reversebeacon.net</u>







#### **Propagation at a glance**



160m / 80m / 40m / 30m / 20m / 17m / 15m / 12m / 10m / 6m / 2m / world wide / zoom to US / zoom to Europe / zoom to North Atlantic





#### Filtering



callsign lookup:

#### REVERSE BEACON NETWORK

welcome main dx spots skimmers downloads about contact us

#### create your filter, or choose one on the list at the right side of the screen >>>

		DX station		DE station	band	mode
dxcc:	$\odot$	any	$\odot$	any 💌	🗆 all 🔺	any 💌
itu zone:	0	any 💌	$\circ$	any 💌	137kHz	
oq zone:	$\circ$	any 💌	0	any 💌	□ 160m	
continent:	$\circ$	any 💌	0	any 💌	🗖 60m 🗨	
proceed						
the DX statio	on col	umn refers to the station which is being spot	ted.			
he DE statio	on col	umn refers to the station where the spot com	es fron	n.		
my last filt	ters:					
DE cq zone	: 5 - e	astern zone of NA				
DE cq zone	: 4 - c	entral zone of NA				
DE continer	nt: NA	- North America				
DE cq zone	- 14 - - 3 - v	vestern zone of NA				

#### ready made filters

SSN:83 SFI:113 A:7 K:2

HF last 50 HF 137kHz HF/CW 1.8MHz HF/SSB 3.5MHz 5MHz 1.8/3.5/7MHz 7MHz 14/21/28MHz 10MHz 10/18/24MHz 14MHz 18MHz 21MHz 24MHz 28MHz VHF+ VHF+/CW 50MHz VHF+/SSB 70MHz 144MHz 430MHz 1.2GHz





DE = IK3STG

#### Who is W3LPL hearing?



160m / 80m / 40m / 30m / 20m / 17m / 15m / 12m / 10m / 6m / 2m / world wide / zoom to US / zoom to Europe / zoom to North Atlantic

#### show/hide my last filters

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	showing spo	ots for spotter call: W3	LPL			rows to s	how: 50 -		
	search spot	search spot by callsign							
	de	dx	freq	cq/dx	snr	speed	time		
	W3LPL	🙎 403A	14023.0	CQ [LoTW]	14 dB	33 wpm	1213z 09 Apr		
	W3LPL	PI4DIG	14053.0	CQ	15 dB	24 wpm	1213z 09 Apr		
	W3LPL	RD3A	14035.0	CQ	22 dB	31 wpm	1213z 09 Apr		
	W3LPL	K9CM	7037.0	CQ	36 dB	27 wpm	1213z 09 Apr		
	W3LPL	LZ1YE	14050.0	CQ	19 dB	29 wpm	1213z 09 Apr		
~~~~	W3LPL	HI8A	10106.4	CQ	10 dB	19 wpm	1213z 09 Apr		
০ (েনিন্মি ০	W3LPL	W1ESE	7007.5	CQ [LoTW]	29 dB	32 wpm	1212z 09 Apr		
	W3LPI	RK3EEW	14023.6	CQ	20 dB	30 wpm	1212z 09 Apr		
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#### Who's Hearing the A71?



160m / 80m / 40m / 30m / 20m / 17m / 15m / 12m / 10m / 6m / 2m / world wide / zoom to US / zoom to Europe / zoom to North Atlantic

#### show/hide my last filters

DX dxcc: A7 - Qatar rows to show: 50								
de	dx	freq	oq/dx	snr	speed	time		
SM7 SJR	A71EM	21016.0	CQ [LoTW]	13 dB	37 wpm	1219z 09 Apr		
ES5PC	A71EM	21015.8	CQ [LoTW]	35 dB	38 wpm	1219z 09 Apr		
IK3 STG	A71EM	21015.8	CQ [LoTW]	8 dB	38 wpm	1219z 09 Apr		
OH6CT	A71EM	21015.8	CQ [LoTW]	15 dB	37 wpm	1219z 09 Apr		
S50ARX	A71EM	21015.8	CQ [LoTW]	15 dB	34 wpm	1219z 09 Apr		
UA9CLB	A71EM	21015.9	CQ [LoTW]	36 dB	36 wpm	1219z 09 Apr		
DK9IP	A71EM	21015.8	CQ [LoTW]	16 dB	37 wpm	1219z 09 Apr		
JH3PRR	A71EM	21016.0	CQ [LoTW]	24 dB	39 wpm	1218z 09 Apr		



### How Am I Getting Out?

- Filter for your call as the DX station
- Send sequence recognized as a "CQ"
  - Example: TEST TEST DE N4ZR N4ZR N4ZR
- Watch the screen for results. Collect all US stations heard in Europe, for example, to compare.





#### How Does my Signal Compare in Europe?





#### show/hide my last filters

	DX dxcc: K - U cancel filter s	United States / DE co election / search sp		rows to show: 50 💌			
	de	dx	freq	oq/dx	snr	speed	time
	S50ARX	AB3CX	14008.9	CQ [LoTW]	5 dB	26 wpm	1225z 09 Apr
	TF3Y	MM5A	14032.0	CQ	11 dB	26 wpm	1224z 09 Apr
	DK9IP	AB3CX	14008.9	CQ [LoTW]	7 dB	26 wpm	1224z 09 Apr
	IK0XBX-1	AB3CX	14008.9	CQ [LoTW]	4 dB	26 wpm	1224z 09 Apr
	ES5PC	MM5A	14032.0	CQ	21 dB	26 wpm	1221z 09 Apr
	ES5PC	K3RA	14004.7	CQ	12 dB	24 wpm	1221z 09 Apr
	ES5PC	K3RA	14004.7	CQ	12 dB	24 wpm	1221z 09 Apr
7.0	LA5EKA	K3RA	14004.8	CQ	5 dB	23 wpm	1220z 09 Apr
00	IIZOVDV 4	ME NOCE	44047.7	CO II - TMI	0.40		4040- 00 0



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### Comparing with others- the Spots Analysis Tool

- Developed by F5VIH/SV3SJ
- Select a date, a "reverse beacon" station, and calls to compare.
- The tool will produce graphs showing comparative results for up to 10 stations at a given location, over time.
- Example ARRL DX CW, first day, K3LR, W3LPL, N3RS, NQ4I





#### A little crowded?







### Zooming in





#### **Roll Your Own**



- Download raw data a day at a time
- Open in Excel or MS Access
- Please share your analytical ideas we can all learn from each other
- Reflectors
  - <u>skimmertalk@contesting.com</u>
  - <u>RBN-OPS@yahoogroups.com</u>





### What About Use *During* Contests?



- Because Skimmers spot everything, ideally suited for Unlimited and multi-op contesting
  - S&P rates >150/hour readily attainable when the bands are full
  - Finding odd-ball openings almost assured, with 50+ stations listening





#### But...



- RBN spot volume reached almost 10 spots per second during major contests – will continue to increase.
- The feed contains many duplicate spots

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JA4ZRK	🚢 9A5MT	14005.0	CQ [LoTW]	9 dB
N7TR	CS5DNO 😂	3512.0	CQ [LoTW]	12 dB
JA4ZRK	CS5DNO S5DNO	3512.0	CQ [LoTW]	15 dB
JH3PRR	CS5DNO 😂	3512.0	CQ [LoTW]	15 dB
NC7J	🔤 VK4SN	14005.2	CQ	10 dB
EI6IZ	R9UT	14027.3	CQ	23 dB
N4ZR	🚟 VK4SN	14005.3	CQ	13 dB
ES5PC	🔤 VP5/W5CW	18073.2	CQ	29 dB
JH3PRR	OH1RX	21028.3	CQ	23 dB
RN4WA	ZL3TE	14010.0	CQ [LoTW]	5 dB
DK9IP	OH1RX	21028.0	CQ	39 dB
N7TR	W9NGA	7013.5	CQ [LoTW]	51 dB
WOMU	W9NGA	7013.5	CQ [LoTW]	42 dB
NC7J	W9NGA	7013.5	CQ [LoTW]	44 dB
W3UA	W9NGA	7013.6	CQ [LoTW]	11 dB
K3MM	W9NGA	7013.6	CQ [LoTW]	22 dB



# How to Use the RBN in a Contest



#### • Filter at the node to meet your needs

- Spot origin (country, zone, US state, VE province)
- Filter in your logging program
  - Screen out remaining duplicates
  - Select bands, all spots or just new mults





#### **A Unique Tool**

Available - 47	Mults 31 Qs	(Basic V	FO Contro	ol) of 45 total spo	ts	×
	Mults			Qs		
	0	16	0	0/0		
	0	80	5	0/0		
	7	4		6/10		
	14	2		10/11		
	11	1!	5	6/6		
	15	1		9/9		
	-		<u> </u>	[ ===	[	_
Call	Freq	Dir	Mode	<u>  TS</u>	S/N	
UA3D	7022.0	033° #	CW	04-12 115900	02 dB	
WB5NUK	7034.8	248°¤ #	CW	04-12 115853	23 dB	
DL1LQR	7034.5	047* #	CW	04-12 115852	13 dB	
F8DGY	28012.1	055° #	CW	04-12 115838	16 dB	
UA3DCZ	7022.0	033° #	CW	04-12 115836	38 dB	
W9QB	7044.7	287*¤ !	CW	04-12 115826	18 dB	
S52WD	14016.0	051° #	CW	04-12 115824	30 dB	
RU4CS	14037.9	032° #	CW	04-12 115823	19 dB	
DF4ZY	7025.1	047° #	CW	04-12 115820	03 dB	
OH7QR	21058.0	029° #	CW	04-12 115813	20 dB	
KI4XH	7022.6	220°¤ #	CW	04-12 115803	11 dB	
N4S	14050.0	220°¤ #	CW	04-12 115758	23 dB	-
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### The RBN's Future



- Multiple servers and load-balancing to scale for growing demand
- Improved filtering interface for user convenience
- Better analytical tools





#### **The W3LPL-2 Experiment**



- Feeding carefully-selected Skimmer spots into the traditional cluster network through custom filtering software
  - Limited in quantity -
  - Carefully checked to ensure no busts
  - Spots limited to list of about 1000 callsigns, with most common excluded
  - Re-spotting interval adjustable by relative rarity





#### **RBN Assets**



- <u>http://reversebeacon.net</u> the RBN web site
- <u>http://reversebeacon.blogspot.com</u> the RBN blog
- DXSpider node: telnet.reversebeacon.net port 7000
- ARCluster node: arcluster.reversebeacon.net port 7000





#### **Other Resources**

- Skimmertalk@contesting.com
- <u>RBN-OPS@yahoogroups.com</u>





